HT-01-003

26512
#2
BT
01.14.02

November 9, 2001

To: Commissioner of Patents and Trademarks
Washington, D.C. 20231

Fr: George O. Saile, Reg. No. 19,572
20 McIntosh Drive
Poughkeepsie, N.Y. 12603

Subject: Serial No. 09/953,539 09/17/01

Bernard Dieny, Cheng Horng,
Kochan Ju, Min Li, Simon Liao

MULTILAYERED STRUCTURES COMPRISING MAGNETIC NANO-OXIDE LAYERS FOR CURRENT PERPENDICULAR TO PLANE GMR HEADS

Grp. Art Unit: 2652

INFORMATION DISCLOSURE STATEMENT

Enclosed is Form PTO-1449, Information Disclosure Citation In An Application.

The following Patents and/or Publications are submitted to comply with the duty of disclosure under CFR 1.97-1.99 and 37 CFR 1.56. Copies of each document is included herewith.

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on ~~November~~ Dec 13, 2001.

Stephen B. Ackerman, Reg. #37661

Signature/Date 12/13/01

U.S. Patent 5,650,958 to Gallagher et al., "Magnetic Tunnel Junctions with Controlled Magnetic Response," provides a MTJ structure formed with Ni81Fe19 layers as the pinned and free ferromagnetic layers, a Mn50Fe50 layer as the antiferromagnetic layer and Al2O3 layer as the insulating tunnel layer.

U.S. Patent 5,668,688 to Dykes et al., "Current Perpendicular-to-the-Plane Spin Valve Type Magnetoresistive Transducer," discloses a transducer which includes a spin valve (SV) structure comprising a pinned ferromagnetic layer adjoining a first end portion thereof and a freely rotating ferromagnetic layer adjoining an oppositely disposed second end portion thereof.

U.S. Patent 6,198,609 to Barr et al., "CPP Magnetoresistive Device with Reduced Edge Effect and Method for Making Same," addresses certain current flow problems that persist even in the CPP design.

U.S. Patent 5,898,548 to Dill et al., "Shielded Magnetic Tunnel Junction Magnetoresistive Read Head," teaches a method of forming a magnetic read head using a similar MTJ element as a read sensor.

U.S. Patent 6,111,784 to Nishimura, "Magnetic Thin Film Memory Element Utilizing GMR Effect, and Recording/Reproduction Method Using Such Memory Element," teaches a method of forming an MTJ structure for use as a magnetic thin film memory, wherein the MTJ structure comprises a first magnetic layer, a non-magnetic, partially insulating tunneling layer and a second magnetic layer, the two magnetic layers having different coercivities.

U.S. Patent 6,171,693 to Lubitz et al., "Structures with Improved Magnetic Characteristics for Giant Magneto-Resistance Applications," teaches a method of forming a GMR stack having at least two ferromagnetic layers separated from each other by a nonferromagnetic layer, wherein a layer of phase-breaking material such as Ta or a Ta-alloy between the ferromagnetic layer and the nonferromagnetic layer prevents the undesirable growth of large-grained structures in the ferromagnetic layers.

An article by K. Nagasaka et al., "Giant magnetro-resistance properties of a specular spin valve films in a current perpendicular to plane structure," Journal of Applied Physics, Vol. 89, No. 11, June 1, 2001, pp. 6943-6945, describes conventional and specular spin valve films in a current perpendicular to plane (CPP) structure.

An article by K. Bussman et al., "CPP Giant Magneto-resistance of NiFeCo/Cu/CoFe/Cu Multilayers," IEEE Trans. on Magnetics, Vol. 34, No. 4, July 1998, pp. 924-926, describes CPP (Current perpendicular-to-plane) magnetotransport measurements that have been performed on lithographically patterned magnetic multilayers of NiFeCo/Cu/CoFe/Cu.

An article by J.J.M. Ruigro et al., "Disk recording beyond 100 Gb/in. squared: Hybrid recording? (invited), Journal of Applied Physics, Vol. 87, No. 9, May 1, 2000, pp. 5398-5403, describes a new method for recording above 100 Gn/in2 called "hybrid recording".

An article by P. Seneor et al., "Large mangetoresistance in tunnel junctions with an iron oxide electrode," Applied Physics Letters, Vol. 74, No. 26, June 28, 1999, pp. 4017-4019, discusses the fabrication and properties of (cobalt/alumina/ iron oxide) tunnel junctions.

An article by Akira Yanase et al., "Band Structure in the High Temperature Phase of Fe3O4," Journal of the Physical Society of Japan, Vol. 53, No. 1, January, 1984, pp. 312-317, describes how the band structure of the ferrimagnetic Fe3O4 was calculated in the high temperature cubic phase by means of self-consistent APW method.

An article by Ze Zhang et al., "Electron states, magnetism, and the Verwey transition in magnetite," Physical Review B, Vol. 44, No. 24, December 15, 1991-II, pp. 11 319-13 331, discusses using density-functional calculations to examine the electronic structure of magnetite in the spinel crystal structure.

Sincerely,

Stephen B. Ackerman,
Reg. No. 37761